

distinctly six-jointed,—the anterior portion, including the base of the maxillipeds, being separate from the five segments bearing the natatory feet. In some specimens, which in other respects were like the remainder, the antennæ were rather shorter than usual. It would be very desirable to ascertain, by the examination of a number of specimens, how much variation exists in this character. Prof. Dana describes the two posterior subapical setæ of the anterior antennæ as “subequal;” in all my specimens the antepenultimate seta was distinctly the larger of the two.

According to Mr. Toynbee’s notes, his specimens had red antennæ and feet; while Prof. Dana’s were of a faint purplish-blue colour.

Of two specimens which were captured on the 15th of December 1858, each had two spermatic tubes attached to the posterior part of the cephalothorax. The specimens in question had the segments of the abdomen gradually decreasing in length, the basal being at least half as long again as the second segment.

This species was met with on several occasions.

Collected October 25. S. lat. $13^{\circ} 43'$; W. long. $33^{\circ} 55'$.

„ November 4. S. lat. $33^{\circ} 27'$; W. long. $30^{\circ} 28'$.

„ November 22. S. lat. $40^{\circ} 53'$; E. long. $45^{\circ} 22'$.

„ December 14. S. lat. $5^{\circ} 49'$; E. long. $83^{\circ} 17'$.

** *Cephalothorax supernè visus posticè acutus, angulis posticis non appressis.*

CALANUS BREVICORNIS, Lbk.

This species may at once be distinguished from *Calanus setuligerus*, which it otherwise much resembles, by the shortness of the antennæ, and by the front being produced in front of the stylets and of the base of the antennæ. The cephalothorax was five-jointed in my previous specimens; in the present individuals it had six segments—an important variation, which appears also to occur in *C. setuligerus*.

Collected November 22, 1858. S. lat. $40^{\circ} 53'$; E. long. $45^{\circ} 22'$.

„ „ S. lat. $0^{\circ} 30'$; W. long. $0^{\circ} 30'$.

CALANUS COMMUNIS, Dana.

Collected October 7th. N. lat. $7^{\circ} 15'$; W. long. $27^{\circ} 2'$.

„ June 22nd. S. lat. $0^{\circ} 40'$; W. long. $0^{\circ} 20'$.

CALANUS VULGARIS, n. s. Frons rotundatus. Cephalothorax 5-articulatus, supernè visus angulis posticis acutis, non appressis; latere visus rotundatus, inermis. Antennæ anticæ corpore paulo breviores, setis apicalibus brevibus, anticâ penultimâ elongatâ, posticâ penultimâ antepenultimâque longioribus subæquis. Abdomen 4-articulatum, stylis caudalibus brevibus, setis mediocribus, secundis longioribus.

In general outline, in the proportion of the cephalothoracic and abdominal segments, and in the setæ of the anterior antennæ, this species very closely resembles *C. communis*, from which, however, it differs in the relative shortness of the antennæ, and in having the cephalothorax unarmed behind. It is true that Dana makes no mention of the lateral cephalothoracic hook; but it was present in all the specimens examined by me which possessed the other characters of the species.

Collected May 3.	S. lat. 0° 40'; W. long. 0° 20'.
„ October 7.	S. lat. 7° 15'; W. long. 27° 52'.
„ November 22.	S. lat. 40° 53'; E. long. 45° 22'.
„ November 30.	S. lat. 34° 43'; E. long. 77° 0'.

B. *Setæ caudales 2dæ longissimæ. Frons obtusus, rotundatus.*

CALANUS DANAI, Lbk. Cephalothorax 6-articulatus, posticè obtusus, capite discreto; segmentis tribus penultimis subæquis, postico brevi. Antennæ anticæ corpore paulo longiores, setâ antepenultimâ posticâ longissimâ. Abdomen mediocre, 4-articulatum. Styli caudales breves, setis secundis longissimis.

This species is nearly allied to the three last described by Dana, namely, *C. gracilis*, *elongatus*, and *attenuatus*. These three, however, all have the anterior antennæ much longer than the body, and the cephalothoracic segments four or five in number, and are altogether longer and slenderer. The second pair of antennæ resemble those of *C. mirabilis* (Trans. Ent. Soc. vol. iv. pl. 5. f. 2), though the arrangement of the hairs is not exactly the same. There are four pairs of natatory feet. Pl. XXIX. fig. 2 represents a leg of the fifth pair, which is somewhat peculiar. The second segment of the abdomen is larger than the other three. The caudal lamellæ are a little longer than the posterior segment.

Collected April 27, 8 A.M. S. lat. 0° 40'; W. long. 0° 20'.

PL. XXIX. fig. 2. posterior leg, × 30; fig. 3. end of anterior antenna, × 30.

CALANUS GRACILIS, Dana.

The second pair of antennæ in my specimen do not resemble those of *Calanus attenuatus*, nor are they formed upon the type usual in *Calanus*, but resemble those of *Diaptomus*,—the accessory branch having four small intermediate segments, each with a long seta. The abdomen also is quite unlike that of *C. attenuatus* and *elongatus*, next to which this species is placed by Prof. Dana.

Of this species there is one specimen, collected on the 7th July, 0° 40' S. lat., and 0° 20' W. long.

CALANUS MIRABILIS, Lbk.

This species was described by me in the 'Transactions of the Entomological Society of London,' vol. iv. pt. 2. p. 10. My specimens wanted the terminal segment of the anterior antenna. This segment bears a short plumose hair in the middle, and four beautiful dark-red setæ, three of which are of considerable size, and two are beautifully plumose. None of them, however, are so large as the two posterior subapical setæ, which are nearly equal in size. In the present specimens the cephalothorax was 6-jointed, the head being separate; the separation of the two last cephalothoracic segments was indistinct, and they were smaller than the two preceding. The caudal lamellæ had four long hairs, but the ends were all broken off. Colour slightly pink.

Collected February 1, 1858. S. lat. 0°; W. long. 0° 30'.

In PL. XXIX. fig. 1, two of the secondary setæ and a part of one of the large antennary hairs is represented, under a magnifying power of 250.

EUCHÆTA.

EUCHÆTA ATLANTICA, Lbk.

Some of these specimens, and also some collected on the 7th October, had spermatie tubes attached to their abdomen. One of the latter also carried some eggs.

Collected March 25th. S. lat. $0^{\circ} 30'$; W. long. $0^{\circ} 30'$.

„ February 1. S. lat. $0^{\circ} 30'$; W. long. $0^{\circ} 30'$.

„ May 14. S. lat. $0^{\circ} 40'$; W. long. $0^{\circ} 20'$.

„ October 7. N. lat. $7^{\circ} 15'$; W. long. $27^{\circ} 52'$.

EUCHÆTA SUTHERLANDII, Lbk.

Collected October 7. N. lat. $7^{\circ} 15'$; W. long. $27^{\circ} 52'$.

UNDINA.

UNDINA LONGIPES, Lbk.

There was only one specimen of this species. The fifth pair of legs did not exactly agree with my drawing (*l. c.* pl. 6. fig. 5), as the terminal part of the long leg was considerably produced. On referring, however, to the specimen from which my drawing was made, I find that it is perfectly correct; so that probably this organ varies in form.

Collected October 7, 1858, in lat. $7^{\circ} 15' N$, long. $27^{\circ} 52' W$.

UNDINA DARWINII, n. s. Frons rotundatus. Cephalothorax 5-articulatus, supernè visus subacutus, latere visus rotundatus. Antennæ anticæ corporis ferè longitudine, articulo primo elongato, setis brevibus: seta articuli secundi et octavi longiuscula, recta; seta postica apicalis et antica penultima articulo longiores, postica antepenultima tamen brevior. Pes posticus dexter elongatus, sinister brevis. Abdomen 5-articulatum. Styli caudales breves; setæ plumosæ, secundæ vix duplo longiores.

The basal segment of the anterior antennæ is long; probably, however, it consists in reality of three true segments. The second, third, and fourth segments have almost coalesced, or rather, perhaps, have scarcely separated. The second and eighth (apparent) segments bear a rather long straight hair. The posterior penultimate hair is the longest of those near the apex (Pl. XXIX. fig. 5).

The posterior leg of the male is long and rather slender: its form is difficult to describe, but is sufficiently indicated in Pl. XXIX. fig. 4. It consists of five segments, the three middle ones subequal and of moderate length. On the outside of the fourth is a long, slender, twisted and blunt appendage. On the inner side of the second segment is a small appendage, which is probably a rudimentary representative of the inner ramus. The left leg is not half as long as the right; it is small, and of the ordinary type, with short spines. The abdomen is 5-jointed, the segments gradually, though not very regularly, decreasing in size. The caudal lamellæ are short. The abdomen is $\frac{40}{2000}$ " in length, of which the lamellæ measure $\frac{5}{2000}$ "; the segments gradually decrease in size. The second caudal seta is $\frac{60}{2000}$ " in length; the others about half as long: but these measures cannot be depended on as exact, as the tips may have been broken off.

Collected January 30, 1858. S. lat. $0^{\circ} 30'$; W. long. $0^{\circ} 30'$.

„ February 10, 1859. N. lat. $8^{\circ} 0'$; E. long. $77^{\circ} 0'$.

PL. XXIX. fig. 4. fifth pair of legs of male, $\times 60$; 5. end of anterior antenna, $\times 60$.

DIAPTOMUS.

DIAPTOMUS ABDOMINALIS, Lbk.

Collected June 7. S. lat. $0^{\circ} 40'$; W. long. $0^{\circ} 20'$.

„ October 7. N. lat. $7^{\circ} 15'$; W. long. $27^{\circ} 52'$.

CANDACE.

CANDACE ORNATA, D.

Collected September 15. N. lat. $47^{\circ} 41'$; W. long. $7^{\circ} 58'$.

CANDACE PACHYDACTYLA, D.

Collected December 15. S. lat. $0^{\circ} 40'$; W. long. $0^{\circ} 20'$.

„ September 15. N. lat. $47^{\circ} 41'$; W. long. $7^{\circ} 58'$.

„ October 7. N. lat. $7^{\circ} 15'$; W. long. $27^{\circ} 52'$.

PONTELLA.

Subgenus *Calanopia*.*Calanopia* BRACHIATA, D.Subgenus *Pontellina*.*Pontellina* TURGIDA, D.

Collected in S. lat. $0^{\circ} 40'$; W. long. $0^{\circ} 20'$.

„ N. lat. $2^{\circ} 3'$; E. long. $86^{\circ} 14'$.

Pontellina PERSPICAX, D.*Pontellina* BAIRDII, Lbk.

Collected March 25. S. lat. $0^{\circ} 30'$; W. long. $0^{\circ} 30'$.

„ April 17. S. lat. $0^{\circ} 40'$; W. long. $0^{\circ} 6'$.

CYCLOPIDÆ.

CLYTEMNESTRA.

CLYTEMNESTRA TENUIS, n. s. Cephalothorax subacutè rostratus, segmento antico lato, posticè utrinque dilatato, tribus segmentis sequentibus subito angustioribus, margine posteriore arcuatis, et lateribus posticè productis et subacutis. Abdomen 6-articulatum, segmentis subæquis, decrescentibus, postico bilabato. Antennæ anticæ 7-articulatæ? segmento apicali longo.

The genus *Clytemnestra* is widely extended, being found in the Pacific and in the Atlantic. At present, however, three species only are known: one was found by Dana in the Pacific Ocean and in the China Sea; and a second collected by Dr. Sutherland in the Atlantic, and described by me in the 'Transactions of the Entomological Society,' n. s. vol. iv. p. 25.

Of the present species, only a single specimen was observed. It was a female, and carried a single mass of eggs. The length was about $\frac{1}{25}$ th of an inch. The general outline of the body much resembled that of *C. scutellata*. The anterior antennæ are much longer than in *C. atlantica*, and resemble in their general proportions those of *C. scutellata*. They have also, as in that species, an appendage on the fourth segment counting

from the apex; but, whereas in Dana's species the three terminal segments diminish in size towards the apex, in the present species the apical segment is as long as the three preceding put together. Like Dana, I was unable to satisfy myself as to the form of the appendage. The two terminal setæ appear to be shorter than in the species from the Pacific. The basal part of the antenna had moreover only three segments.

There are four pairs of natatory legs. All the branches had three segments, though in the first pair it was doubtful whether there was any real joint. In all the legs the inner branch was the longer of the two, while in the great majority of the Cyclopoidea the reverse is the case.

The second and third segments of the abdomen have almost completely coalesced, their original separation being indicated by a distinct indentation. The last segment is deeply bilobed.

Dana says nothing about the sexual characters in this genus; and I have had no opportunity of examining a specimen which I knew to be a male. It is moreover quite possible that the present specimen may have been immature.

It was very active. According to a sketch made at the time by Mrs. Toynbee, it seems to have been of a lightish lilac colour, with green and yellow tints inside, and the eye red.

Collected April 15, 1858, in lat. $24^{\circ} 20'$ S., long. $62^{\circ} 53'$ E., at 8 P. M.

PL. XXIX. fig. 6; fig. 7. anterior antenna, $\times 60$.

SETELLA.

SETELLA TENUIS, n. s. Corpus 9-articulatum. Antennæ anticæ crassiusculæ, breves, articulis primis duobus subæquis, tertio quintoque longioribus, quarto appendiculato. Maxillipedis digitus ferè dimidii articuli secundi longitudine. Styli caudales elongati; setæ caudales corpore vix longiores.

This species differs from *S. tenuicornis* and *S. longicauda* in the shortness of the anterior antennæ and the length of the caudal lamellæ, from all the species except *S. Aciculus* in having only nine segments to the body, and from all in the shortness of the abdominal setæ, which are but little longer than the body. I was at first inclined to think that this character ought perhaps not to be relied on, and that the setæ might perhaps be imperfect; they taper, however, so gradually, and to so fine a point, that they can have lost very little, if any, of their length.

The deficiency of a segment in this species and in *S. Aciculus* evidently arises from a coalescence of the first two abdominal segments; so that the two pairs of appendages are both attached to one segment. The anterior antennæ have only six distinct segments, though there are indications of others. The fifth is the longest, then comes the third, while the two basal and the fourth are short and subequal.

The appendage which is, as usual, attached to the fourth segment is rather more than half as long as the apical portion of the antenna. The frontal appendage is shaped as in *S. crassicornis*. The caudal lamellæ are elongated.

The separation of the segments is, however, often so indistinct that I am indisposed to attach much weight to the characters thus afforded.

Collected June 26. S. lat. $0^{\circ} 40'$; W. long. $0^{\circ} 20'$.

PL. XXIX. fig. 12, $\times 30$.

CORYCÆIDÆ.

CORYCÆUS.

1. *Antennæ anticæ macrodactylæ, digito non breviorè quam carpus.*A. *Setæ caudales stylis valdè breviores.*

CORYCÆUS GRACILIS, D.

Collected June 21. S. lat. $0^{\circ} 30'$; W. long. $0^{\circ} 30'$.,, September 29. N. lat. $24^{\circ} 39'$; W. long. $23^{\circ} 28'$.

CORYCÆUS VARIUS, D.

Collected December 30. S. lat. $0^{\circ} 30'$; W. long. $0^{\circ} 30'$.B. *Setæ caudales stylis non valdè breviores, sæpe longiores. Cephalothorax posticè acutus.*

CORYCÆUS LATICEPS, D.

Collected in S. lat. $0^{\circ} 30'$, W. long. $0^{\circ} 30'$.

CORYCÆUS ANGLICUS, Lubbock.

Collected October 7, 1858. N. lat. $7^{\circ} 15'$; W. long. $27^{\circ} 52'$.,, October 20, 1858. S. lat. $13^{\circ} 43'$; W. long. $33^{\circ} 55'$.

Pl. XXIX. figs. 10 & 11.

2. *Antennæ posticæ microdactylæ; digitus articulo secundo brevior.*A. *Seta articuli antennarum posticarum secundi nuda.** *Styli caudales abdomine breviores.*

CORYCÆUS HUXLEYI, n. s. Cephalothoracis segmentum tertium supernè visum breve, angulis posticis productis. Conspicilla parvula, remotiuscula. Antennæ anticæ mediocres, setis longis; antennarum posticarum articulus secundus apice interno bidenticulato, digito ferè longior, setâ longâ, nudâ. Abdomen 2-articulatum, segmento primo paulo latiore et duplo longiore quam secundum. Styli caudales abdomine duplo breviores, setis longioribus.

This species is nearly allied to *Corycæus venustus*, in which species, however, as in many others, Professor Dana has represented the finger as consisting of only two segments; in all the species examined by me, however, the usual three segments were present, though, as is the case in the present species, and probably also in *C. venustus*, the basal is very short.

Length $\frac{17}{1000}$ ths of an inch; length of cephalothorax $\frac{12}{1000}$ " of abdomen $\frac{6}{1000}$ ths of an inch. The first segment of the abdomen is $\frac{6}{2000}$ ", the second $\frac{3}{2000}$ ", the lamella $\frac{4}{2000}$ ", and the caudal setæ $\frac{8}{2000}$ " in length. The claw forms half the length of the finger.

Collected October 20. S. lat. $13^{\circ} 43'$, W. long. $33^{\circ} 55'$.,, July 21. S. lat. $0^{\circ} 30'$, W. long. $0^{\circ} 30'$.Pl. XXIX. fig. 8, $\times 30$; fig. 9. antenna of second pair, $\times 60$?

B. *Seta articuli antennarum posticarum secundi setulosa.*

CORYCÆUS PELLUCIDUS, D.

Collected in S. lat. $0^{\circ} 30'$, W. long. $0^{\circ} 20'$;S. lat. $13^{\circ} 43'$, W. long. $33^{\circ} 55'$.

CORYCÆUS LONGICAUDIS, D.

Collected in N. lat. $7^{\circ} 15'$, W. long. $27^{\circ} 52'$.

ONCÆA, Philippi.

ONCÆA PYRIFORMIS, n. s. Feminae cephalothorax 5-articulatus, rotundatus. Maxillipedes mediocres, antennis posticis paululo majores. Abdomen 5-articulatum, stylis mediocribus. Styli caudales abdomine quadruplo, et setæ caudales duplo breviores.

This species is very nearly allied to *A. obtusa*, which it resembles in shape. The stylets, however, are scarcely one-fourth, and the setæ scarcely half as long as the abdomen. I believe, however, that the length of these setæ varies a little. At least, in one specimen, which in other respects resembled this species, the caudal setæ were about a quarter smaller.

The cephalothorax is five-jointed, and tapers a little behind. The anterior antennæ are four-jointed, the apical segment showing traces of articulations. The setæ are of moderate length. The branches of the natatory legs are three-jointed. The claw of the maxillipeds is scarcely shorter than the preceding joint. The abdomen is five-jointed, the three posterior segments being distinct. The two outer spines of the caudal stylets are ciliated only on the posterior margin.

This description applies to several specimens with bags of eggs attached to the upper side of the abdomen, as described by Dana. There were also some similar specimens without eggs, which, however, may also have been females. But in one case I found a couple connected together, which I suppose to have been male and female. The female had two bags of eggs, as usual. The smaller one, which I suppose to have been the male, clasped the anterior narrow part of the abdomen of the female with its anterior legs. These organs were larger than those of the female; and I am inclined, therefore, to think that this may be a sexual character.

In establishing this genus, Professor Philippi makes no mention of the large eyes; and Dana therefore assumed that they were absent, and placed the genus among the Cyclopidæ. Philippi, however, expressly states ('Wiegmann's Arch.' 1843, vi.) that the specimen was lost before the examination was completed; and in all other respects Dana's genus *Antaria* so closely agrees with *Oncæa*, that I cannot but regard them as synonymous, in which case the latter name, by the rule of priority, must be retained.

Neither Philippi nor Dana, who alone has described any species belonging to this genus, mentions the males; but the two sexes are probably alike.

Several of the specimens carried bags of eggs.

Collected May 17, 1858. S. lat. $0^{\circ} 40'$; W. long. $0^{\circ} 20'$." " N. lat. $7^{\circ} 15'$; W. long. $27^{\circ} 52'$." " S. lat. $40^{\circ} 53'$; E. long. $45^{\circ} 22'$.Pl. XXIX. fig. 24, $\times 30$; fig. 25. abdomen, seen from above, $\times 30$.

SAPPHIRINA.

A. *Conspicilla contigua*.

SAPPHIRINA CYLINDRICA, n. s. Maris conspicilla contigua, fronti insita. Antennarum posticarum digitus articulo secundo paulo longior. Corpus depressum, elongatum, posticè non attenuatum, 10-articulatum, segmento ultimo parvo, tecto. Lamellæ caudales oblongæ, segmento penultimo non longiores. Setæ lamellæque caudales eâdem ferè longitudine.

The peculiar outline of the body distinguishes at once this species from all those described by Dana, at the same time most nearly resembling his *S. metallina*. He does not figure nor describe the second pair of antennæ in that species; and I am therefore unable to compare them with those of *S. cylindrica*, which, as is shown in Pl. XXIX. fig. 14, are somewhat unlike those of its congeners. The branches of the natatory legs are all three-jointed. The anterior antennæ are short, with only four or perhaps five segments, gradually diminishing in size and length towards the apex. The hairs are rather longer than the organ itself.

Collected April 9, at 6 A.M. S. lat. $0^{\circ} 40'$; W. long. $0^{\circ} 20'$.

PL. XXIX. fig. 13, $\times 15$; fig. 14. antenna of second pair, $\times 60$; fig. 15. caudal lamella, $\times 60$.

SAPPHIRINA NITENS, n. s. Conspicilla ferè contigua. Digitus antennarum posticarum paulo longior quam articulus secundus, articulis duobus digiti inæquis; unguiculo brevi. Lamellæ caudales ovatæ, ad apicem rotundatæ, prope apicem internum dente acuto armatæ, setis quatuor, dimidio lamellæ brevioribus.

This species is very nearly allied to *S. coruscans* of Dana, from which it differs in the length of the two-jointed finger, which (without the claw) is rather longer than the second segment. The *male* has five thoracic segments, which diminish in length (and also slightly in breadth) from the front backwards. The abdominal segments are also five in number, and diminish slightly in size like those of the thorax. They are not so much pointed behind as in Dana's figure of *S. coruscans*. In the *female* the first abdominal segment is short and with the sides truncated; the second is rounded; the third, fourth, and fifth lunate. The caudal stylets are ovate, about twice as long as broad. There are four short setæ, and a little spine on the inner apex. The setæ are not more than one-third as long as the lamella. The lamellæ of the male and female seemed to vary a little in shape and in the position of the two apical hairs.

Collected, 8 A.M., April 27, 1858. S. lat. $0^{\circ} 40'$; W. long. $0^{\circ} 20'$.

Also November 22, 1858. S. lat. $40^{\circ} 53'$; E. long. $45^{\circ} 22'$.

PL. XXIX. fig. 16; fig. 17. antenna of second pair, $\times 60$.

SAPPHIRINA ELEGANS, n. s. Conspicilla contigua. Antennarum posticarum digitus articulusque secundus ferè æquales, articulis digiti inæquis, unguiculo vix dimidii digiti. Cephalothorax 5-articulatus, segmento postico lunato, latere rotundato. Abdomen 6-articulatum, articulis tertio quarto quintoque lunatis. Lamellæ caudales ovatæ, latitudine plus duplo longiores, apice interno denticulato, setis quatuor parvulis.

This species is nearly allied to *S. inæqualis*, from the Pacific. The forms of the two posterior cephalothoracic segments are different, and the caudal lamellæ are rather longer than twice their breadth.

Length $\frac{1}{10}$ th of an inch; length of the finger $\frac{17}{2000}$ " , of the 2nd segment $\frac{22}{2000}$ " , of the claw $\frac{8}{2000}$ " , of the caudal setæ $\frac{6}{2000}$ " , of the caudal lamellæ $\frac{27}{2000}$ " ; breadth of the caudal lamellæ $\frac{12}{2000}$ " . The setæ of the appendage to the base of the abdomen were imperfect.

One of the specimens had a number of eggs attached to it.

Collected November 24, 1857. S. lat. $0^{\circ} 30'$; W. long. $0^{\circ} 30'$.

PL. XXIX. fig. 18, $\times 15$; fig. 19. antenna of second pair, $\times 30$.

SAPPHIRINA PARVA, n. s. *Feminae* conspicilla contigua, prominentia. Digitus antennarum posticarum articulo secundo brevior, articulis valdè inæquis, unguiculo dimidii digiti longitudine. Abdomen segmentis primo et secundo angustis truncatis, tertio et quarto latioribus lunatis, postico rotundato. Lamellæ caudales ovatæ, ad apicem rotundatæ, apice interno denticulato, setis duabus terminalibus, duabus lateralibus, omnibus brevibus (lamellâ ferè quadruplo brevioribus).

This species is nearly allied to *S. detonsa*, a Pacific form. It differs, however, in having longer setæ to the caudal lamellæ; and the general outline is a little different. The length of the second segment of the antennæ is $\frac{15}{2000}$ " , that of the finger being $\frac{12}{2000}$ " , and of the claw $\frac{6}{2000}$ " . The breadth of the caudal lamellæ is $\frac{8}{2000}$ " ; their length is $\frac{17}{2000}$ " , and that of longest seta is $\frac{5}{2000}$ " . The total length is about $\frac{1}{15}$ th of an inch.

Collected April 9, 1858, in S. lat. $0^{\circ} 30'$, W. long. $0^{\circ} 30'$.

PL. XXIX. fig. 20, $\times 30$; fig. 21. antenna of second pair, $\times 60$.

SAPPHIRINA, n. s. ?

The collection contains also a specimen closely resembling *S. indigotica*. The finger is however as long as the second joint, the claw is not half as long as the finger, and the caudal setæ are barely half as long as the lamellæ. It must therefore, I think, be considered a new species; but having only one specimen, I do not like to describe it.

Collected in S. lat. $0^{\circ} 40'$, W. long. $0^{\circ} 20'$.

SAPPHIRINA ORIENTALIS, Dana.

I name this species with some hesitation, as it was originally collected by Dana in the Sooloo Sea, south-west of the Island of Panay. It appears, however, to agree exactly with a specimen collected by Captain Toynbee on the 5th Oct., N. lat. 12° , W. long. $20^{\circ} 50'$.

SAPPHIRINA DANAI, Lbk.

Collected in S. lat. $0^{\circ} 40'$, W. long. $0^{\circ} 20'$.

B. *Conspicilla non conjuncta.*

SAPPHIRINA OVATOLANCEOLATA, D.

Collected in S. lat. $0^{\circ} 30'$, W. long. $0^{\circ} 30'$.

SAPPHIRINA GEMMA, D.

Collected, June 18, in S. lat. $0^{\circ} 40'$, W. long. $0^{\circ} 20'$.

SAPPHIRINA THOMPSONI, n. s. *Maris* conspicilla non conjuncta, fronti insita. Digitus et articulus secundus antennarum anticarum eadem ferè longitudinis, articulis duobus digiti inæquis, unguiculo longiusculo (dimidium digiti longitudine superante). Lamellæ caudales latæ, latitudine tamen longiores, apice interno producto et acuto; setæ caudales quatuor, duæ apicales, aliæ externæ, omnes breves (dimidio lamellæ breviores).

I have named this *Sapphirina* after Mr. Thompson, thinking it but right that one species should be dedicated to the discoverer of the genus. The body consists of ten segments gradually tapering backwards,—the posterior, however, being, as usual, small and almost concealed beneath the penultimate. It is of a somewhat peculiar form; so that I have given a separate figure of it. The first five segments are rounded at the sides, the next four have a minute spine at the posterior corners. The seventh, eighth, and ninth segments have on the under side a small toothed flap. The anterior antennæ have only three apparent segments, the first and third about equal, the middle one shorter. The setæ are short. The total length is $\frac{3}{20}$ ths of an inch. The width of each conspicillum is $\frac{1\frac{3}{100}}{2000}$ " , and the space between them $\frac{8}{2000}$ ". The length of the second segment of the posterior antenna is $\frac{2\frac{2}{100}}{2000}$ " , and that of the finger is the same; the claw is $\frac{1\frac{2}{100}}{2000}$ " ; the length of the caudal lamella is $\frac{20}{2000}$ " , and their breadth $\frac{17}{2000}$ ". The caudal setæ are $\frac{5}{2000}$ " in length.

Collected February 1, 1858, at 3 A.M., in S. lat. $0^{\circ} 30'$, W. long. $0^{\circ} 30'$.

PL. XXIX. fig. 22, $\times 15$; fig. 23. antenna of second pair, $\times 60$.

MIRACIA.

MIRACIA EFFERATA, D.

Collected in S. lat. $0^{\circ} 40'$, W. long. $0^{\circ} 20'$.

POLYPHEMIDÆ.

EVADNE.

EVADNE NORDMANNI, Lovén.

Collected in S. lat. $0^{\circ} 40'$, W. long. $0^{\circ} 30'$.

HALOCYPRIDÆ.

CONCHÆCIA.

CONCHÆCIA AGILIS, D.

I am not quite sure about this species. The collection contained only two specimens.

Collected in N. lat. $24^{\circ} 39'$, W. long. $23^{\circ} 28'$.

„ S. lat. $0^{\circ} 30'$, W. long. $0^{\circ} 30'$.

PL. XXIX. fig. 29. maxillæ and legs, $\times 30$.

CONCHÆCIA BIROSTRATA, n. s. Supernè visa elongatè ovata; latere visa oblonga, subrectangulata, posticè paulo altior, fronte instar rostri producta et angulo superno postico denticulato. Antennæ anticæ setis 5 inæquis, unâ longâ, aliis crassis brevibus. Spiculum antennâ longius, sagitticapitatum. Antennarum posticarum articulus secundus duplo longior quam sequentes simul sumti.

This species is at once distinguishable from all the others at present known, by the posterior angle of the back being toothed. In general outline it resembles the other species of *Conchæcia*, but is deeper behind instead of in front.

The anterior antennæ resemble those of *Halocypris atlantica* in the form and arrangement of the setæ; the spiculum, however, is longer than the antenna by its whole head.

The mandibles and first pair of maxillæ are not unlike those of *Halocypris atlantica* (Trans. Ent. Soc. n. s. vol. iv. pl. 12. f. 5 & 6).

The shell is reticulated but very faintly; and the two valves are similar in outline.

Length $\frac{1}{10}$ th of an inch.

Collected April 21 and June 7. S. lat. $0^{\circ} 40'$; W. long. $0^{\circ} 20'$.

N. lat. $7^{\circ} 15'$; W. long. $27^{\circ} 52'$.

S. lat. $13^{\circ} 43'$; W. long. $33^{\circ} 55'$.

PL. XXIX. fig. 26, $\times 30$; fig. 27. anterior antenna, $\times 30$; fig. 28. posterior antenna, $\times 30$.

CONCHÆCIA INTERMEDIA, n. s. Supernè visa ovata, anticè rotundata elliptica, posticè subacuta; latere visa oblonga, subrectangulata, fronte instar rostri producta, dorso ferè recto, angulo postero acutè rectangulato. Spiculum ferè cylindricum, antennâ plus dimidio longius. Antennarum secundarum articulus secundus duplo longior quam ultimi simul sumti. Pes mandibularis articulo secundo elongato, tribus ultimis non inflexis, vix attenuatis.

This species possesses the general outline of *Conchæcia*, with an almost cylindrical spiculum and short setæ to the first pair of legs. Prof. Dana gives the flexure of the three terminal segments of the mandibular palpus as a generic character. Although, however, it is true that they are generally bent down, this is not always the case. Moreover their base is provided with two strong muscles—a flexor and an extensor; so that they must have considerable play; and I have represented a specimen (Pl. XXIX. fig. 15) in which they are as little bent as is the case in *Halocypris*, which also has the two muscles, and must therefore have the power of bending the three terminal segments.

The present species, again, though in general outline it resembles the typical species of *Conchæcia*, differs from it in having the spiculum cylindrical; and the palpus of the mandibles is at any rate not always inflexed.

The anterior antennæ resemble those of *H. atlantica*; but the spiculum is longer than in that species.

The five setæ of the appendage to the second antennæ are all elongated, as usual; but their appearance is peculiar; and I am uncertain whether they are perfect or not, as they scarcely taper at all and yet do not look as if they had been broken off. The same remark applies also to the setæ of the anterior antennæ.

The terminal setæ of the first pair of legs are rather short, as in *Halocypris*. The two valves are similar to one another.

The shell is not latticed.

Length $\frac{1}{20}$ th of an inch.

Collected May 3, in S. lat. $0^{\circ} 40'$, W. long. $0^{\circ} 20'$.

PL. XXIX. fig. 30, $\times 30$.

CONCHÆCIA CURTA, n. s. Corpus curtum. Latere visa literæ formâ D similis, dorso ferè recto, anticè rostrato, posticè rotundato; supernè visa anticè rotundata, posticè subacuta. Spiculum sagitticapitatum. Antennæ primæ setis 3 longis, subæquis. Antennarum secundarum articulus secundus duplo longior quam ultimi simul sumti. Pes mandibularis articulo secundo vix elongato, articulis sequentibus subæquis, vix attenuatis. Pedes primi setis 3 apicalibus, longis, articulo ultimo perbrevis.

Surely this species must be considered as intermediate between *Conchæcia* and *Halocypris*, since, with the sagittate spiculum, the first pair of maxillæ, and the long hairs at the end of the first pair of legs, which belong to the former, it possesses the general outline of *Halocypris*. Moreover the second segment of the mandibles is not so much elongated as in *Conchæcia*. Upon the whole, however, the characters which point to *Conchæcia* seem more important than those which would unite it to *Halocypris*. The generic description of *Conchæcia* must, however, be altered; but I am unwilling to do so until we are acquainted with a greater number of species, and with the differences which may occur at different ages. The difference in general outline is very marked between the extreme forms; but some of the new species already discovered tend to fill up the gap, and render the rule less easy of application.

The spiculum is $\frac{43}{2000}$ " in length, the anterior antenna being $\frac{30}{2000}$ " : they are 3-jointed.

The little appendage of the posterior antennæ has a strong spine on the basal segment, which is opposed to another, longer, curved spine, which springs, as well as the four long setæ, from the small apical segment.

In outline the two valves are nearly, if not quite, similar to one another.

The shell is reticulated, as in *Halocypris rostrata*.

Length $\frac{7}{200}$ ths of an inch.

Collected April 19, in S. lat. $0^{\circ} 40'$, W. long. $0^{\circ} 20'$.

PL. XXIX. fig. 8, $\times 30$; fig. 9. anterior antenna, $\times 30$.

HALOCYPRIS, D.

HALOCYPRIS ATLANTICA, Lbk.

This species was described by me in the 'Transactions of the Entomological Society,' n. s. vol. iv. part ii. My previous figure, however, gives a somewhat incorrect idea of the organ. The two antennæ were lying one exactly over the other (as I have ascertained by referring to the actual specimen copied); and I have consequently represented too many hairs. In fact there is one long seta, and four rather short thick rod-like hairs which end abruptly and without tapering. In my previous specimen these hairs were imperfect. The spiculum is slightly swollen at the free end.

The second segment of the posterior antennæ is twice as long as the succeeding joints.

Collected in S. lat. $0^{\circ} 40'$, W. long. $0^{\circ} 20'$.

HALOCYPRIS BREVIROSTRIS, D.

This species appears to be very common. The anterior notch is single in one valve, and double in the other. The latter was on the left side in four specimens examined by me.

Collected in S. lat. $0^{\circ} 40'$, W. long. $0^{\circ} 20'$.

HALOCYPRIS ROSTRATA, n. s. Supernè visa elliptica, posticè subacuta; latere visa literæ D formâ similis, dorso ferè recto, anticè rostrato, posticè rotundato. Antennæ anticæ setis inæquis. Spiculum cylindricum, antennâ vix longius. Antennæ posticæ 7-articulatæ, articulo secundo duplo longiore quam ultimi simul sumti.

This species is nearly allied to *H. brevirostris*; and as my specimens were mostly rather smaller and the two were taken together, I was at first somewhat doubtful whether the differences did not depend on age. The second segment of the posterior antennæ is, however, longer in proportion to the terminal portion—a difference which Prof. Dana considers of specific value ('Crustacea,' pp. 1302, 1303). Moreover some of the notched specimens were as large as *H. brevirostris*. The setæ belonging to the longer branch of the posterior antennæ are plumose; those of the two-jointed appendage are naked.

There is an indication of a minute segment at the base of the long branch; and the terminal portion also seemed to consist of six segments rather than five.

The spiculum is scarcely longer than the anterior antenna.

The three terminal segments of the mandibular palpus scarcely diminish at all in breadth. The second segment is short and broad.

The two valves are similar to one another in outline.

The shell is latticed by longitudinal and transverse bars.

Length $\frac{1}{30}$ th of an inch.

Collected April 22, in S. lat. $0^{\circ} 40'$, W. long. $0^{\circ} 20'$.

PL. XXIX. fig. 33, $\times 30$; fig. 34. mandible, $\times 30$.

HALOCYPRIS TOYNBEEANA, n. s. Supernè visa, brevissimè ovata; latere visa subrotundata, literæ D formâ similis, dorso ferè recto, angulis rotundatis, fronte obsolete prominulâ. Antennæ anticæ 3-articulatæ, setis nudis, uno longiore. Antennæ posticæ 9-articulatæ, articulo secundo plus duplo longiore quam sequentes simul sumti.

I have done myself the pleasure of calling this species after Capt. Toynbee, to whose industry and love for science we owe this valuable collection. It differs from *H. inflata* in general outline, and in the posterior antennæ. These latter are unlike those of any other species, in the arrangement and form of the large hairs belonging to the little appendage; these are six in number: four of them are simple and naked; one is longer, and clubbed at the end; and the other is thick, and bent upon itself in the form of a sickle. The larger branch of the antenna is 8-jointed, and the hairs belonging to it are plumose.

The mandibles are like those of *H. inflata* in form, but differ a little in the arrangement of the hairs.

The two pairs of maxillæ and of legs offer no very striking peculiarities.

Length $\frac{1}{15}$ th of inch. The animals were very active.

Collected June 25, in S. lat. $0^{\circ} 40'$, W. long. $0^{\circ} 20'$.

A collection made in N. lat. $7^{\circ} 15'$, W. long. $27^{\circ} 52'$, contained some specimens agreeing very closely with this species, except in wanting the recurved spine on the appendage of the second pair of antennæ. This may perhaps be a sexual difference.

PL. XXIX. fig. 35, $\times 30$; fig. 36. anterior antenna, $\times 30$; fig. 37. posterior antenna, $\times 30$; fig. 38. mandible, $\times 30$; fig. 39. carapace, $\times 30$.

PÆCILOPODA.

BACULUS, n. g.

BACULUS ELONGATUS, n. s. Cephalothorax 4-articulatus, segmento antico maximo, sequentibus brevibus, subæquis. Oculi duo, parvi. Antennæ quatuor, posticis prehensilibus. Truncus buccalis magnus. Maxillipedes fortes. Pedes natatorii octo, biremes. Abdomen 1-articulatum, elongatum.

The interesting specimen above described is quite unlike any other with which we are yet acquainted; but as it bears no eggs, it is impossible to ascertain what is its sex, or whether it is yet mature. If not, it may be a young state of some little-known species; but unless this is the case, it must, I think, be considered as the type not only of a new genus, but also of a new family. In general form it resembles a constable's staff. It is thickest near the front end, and gradually tapers to the other extremity.

The cephalothorax is four-jointed; the first segment occupies more than two-fifths of the whole length. The three following segments are small, and rounded at the sides. The eyes are two in number, small, and seated on a mass of pigment. The anterior antennæ are short, three- or four-jointed, and clothed with rather long hairs on the front end. The posterior antennæ are shorter and stouter. They end in a large claw, which gives them a prehensile character.

Immediately behind the large suctorial mouth is a pair of jaws, the homologies of which I have not been able to determine.

The natatory feet are eight in number. The abdomen appears to consist of only a single segment; it is ringed at the sides, and ends abruptly. At the posterior extremity are two small, slightly projecting disks.

This remarkable species belongs apparently to the Ergasiloidæ, and at first sight somewhat resembles *Monstrilla*. From this genus, however, it differs altogether in the form of the abdomen, and in the presence of posterior antennæ—a character which might seem to indicate a greater affinity with *Ergasilus*.

Length $\frac{1}{10}$ th of an inch.

Caught April 9, in S. lat. $0^{\circ} 30'$, W. long. $0^{\circ} 30'$.

PL. XXIX. fig. 40, $\times 30$.

DESCRIPTION OF THE PLATE.

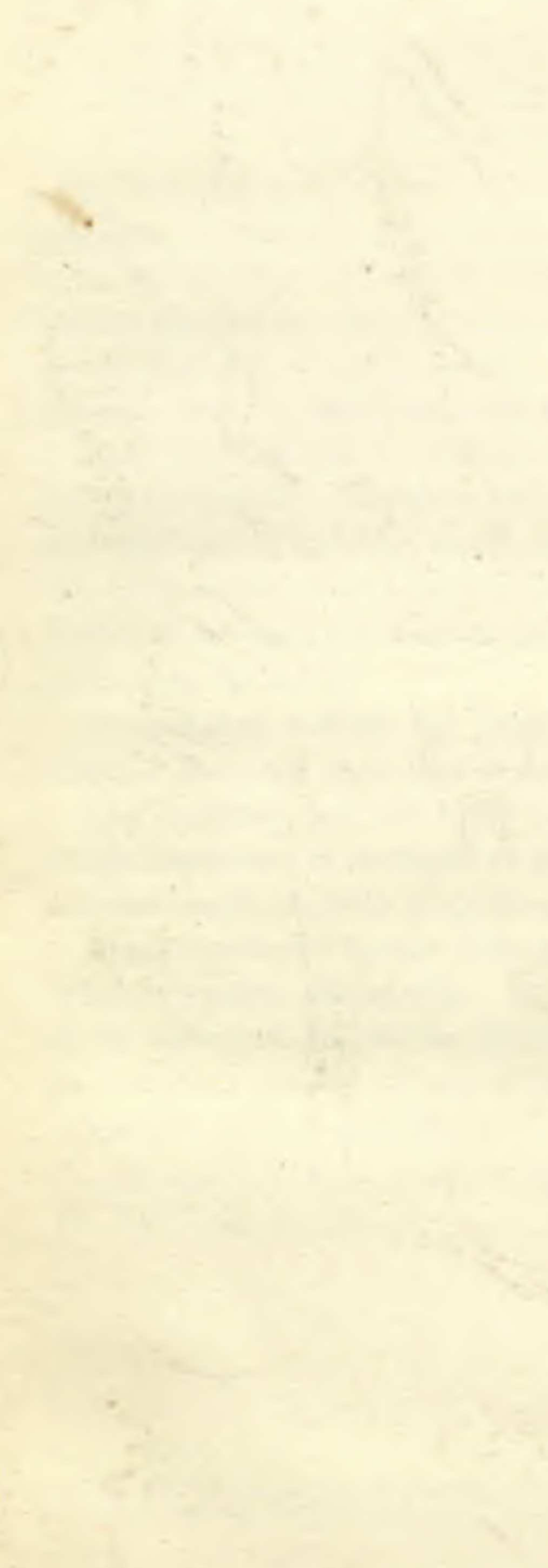
TAB. XXIX.

- Fig. 1. *Calanus mirabilis*. End of anterior antenna, $\times 30$.
 Fig. 2. *Calanus Danæ*. Posterior leg, $\times 30$.
 Fig. 3. *Calanus Danæ*. End of anterior antenna, $\times 30$.
 Fig. 4. *Undina Darwinii*. Fifth pair of legs of male, $\times 60$.
 Fig. 5. *Undina Darwinii*. End of anterior antenna, $\times 60$.
 Fig. 6. *Clytemnestra tenuis*.
 Fig. 7. *Clytemnestra tenuis*. Anterior antenna, $\times 60?$
 Fig. 8. *Corycæus Huxleyi*, $\times 30$.
 Fig. 9. *Corycæus Huxleyi*. Antenna of second pair, $\times 60?$
 Fig. 10. *Corycæus Anglicus*. Antenna of second pair, $\times 60?$
 Fig. 11. *Corycæus Anglicus*. Maxilliped, $\times 60$.
 Fig. 12. *Setella tenuis*, $\times 3$.
 Fig. 13. *Sapphirina cylindrica*, $\times 15?$
 Fig. 14. *Sapphirina cylindrica*. Antenna of second pair, $\times 60$.
 Fig. 15. *Sapphirina cylindrica*. Caudal lamella, $\times 60$.
 Fig. 16. *Sapphirina nitens*.
 Fig. 17. *Sapphirina nitens*. Antenna of second pair, $\times 30$.
 Fig. 18. *Sapphirina elegans*, $\times 15$.
 Fig. 19. *Sapphirina elegans*. Antenna of second pair, $\times 30$.
 Fig. 20. *Sapphirina parva*, $\times 30$.
 Fig. 21. *Sapphirina parva*. Antenna of second pair, $\times 60$.
 Fig. 22. *Sapphirina Thompsoni*, $\times 15$.
 Fig. 23. *Sapphirina Thompsoni*. Antenna of second pair, $\times 60$.
 Fig. 24. *Oncaea pyriformis*, $\times 30$.
 Fig. 25. *Oncaea pyriformis*. Abdomen, seen from above, $\times 30$.
 Fig. 26. *Conchæcia birostrata*. Outline, $\times 30$.
 Fig. 27. *Conchæcia birostrata*. Anterior antenna, $\times 30$.
 Fig. 28. *Conchæcia birostrata*. Posterior antenna, $\times 30$.
 Fig. 29. *Conchæcia agilis*. Maxillæ and legs, $\times 30$.
 Fig. 30. *Conchæcia intermedia*, $\times 30$.
 Fig. 31. *Conchæcia curta*, $\times 30$.
 Fig. 32. *Conchæcia curta*. Anterior antenna, $\times 30$.
 Fig. 33. *Halocypris rostrata*, $\times 30$.
 Fig. 34. *Halocypris rostrata*. Mandible, $\times 30$.
 Fig. 35. *Halocypris Toynbeeana*, $\times 30$.
 Fig. 36. *Halocypris Toynbeeana*. Anterior antenna, $\times 30$.
 Fig. 37. *Halocypris Toynbeeana*. Posterior antenna, $\times 30$.
 Fig. 38. *Halocypris Toynbeeana*. Mandible, $\times 30$.
 Fig. 39. *Halocypris Toynbeeana*. Part of carapace, $\times 30$.
 Fig. 40. *Baculus elongatus*, $\times 30$.

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Handwritten text, possibly a name or subject.

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Final lines of handwritten text at the bottom of the page, possibly a signature or conclusion.



XVI. *On the Anatomy and Development of Pyrosoma.* By THOMAS H. HUXLEY, Esq., F.R.S., F.L.S., Sec. G.S., Professor of Natural History in the Government School of Mines.

Read December 1st, 1859.

§ 1. *History of the Genus PYROSOMA.*

THE genus *Pyrosoma* was first established in 1804 by Péron, in a memoir* published in the fourth volume of the 'Annales du Muséum,' and accompanied by a plate representing the exterior and a longitudinal section of the animal. Péron thus defines the genus and the species which he observed:—

“PYROSOMA.

“Corpus liberum, subconicum, extremitate ampliore apertum vacuum, aperturæ margine intus tuberculis cincto.

“PYROSOMA ATLANTICUM. Æquatorio-atlanticum, gregarie pelagivagum, viridissime phosphorescens, coloribus eximiis tunc effulgens, in aquis viginti duobus reaumurianis calidioribus occurrens, 10–12, 14–16 centrimetros æquans.”

M. Péron's conceptions of the exigencies of a zoological diagnosis were evidently of a singular kind, and his memoir contains not a single observation calculated to throw light upon the true nature of one of the most remarkable animals that has ever been discovered. With respect to the striking property which gave rise to the name conferred on the genus, Péron asserts that the *Pyrosomata* exhibited movements of alternate contraction and dilatation at regular intervals; and that each contraction was accompanied by the development of a luminosity, which, when at its brightest, was red, but, in dying away, passed through shades of orange, green, and blue. The light was developed upon irritation, and entirely ceased with the animal's death. The only indication of locomotive power was the regular contraction just described, whose necessary effect was a slight retrogressive movement, in consequence of the reaction of the water forced out of the open end of the *Pyrosoma*.

In 1815, Lesueur, having previously, as he states, described and figured a new species (*P. elegans*) in the 'Nouveau Bulletin de la Société Philomatique' for 1813, added a number of important details to Péron's account in his "Mémoire sur l'organisation des

* "Mémoire sur le nouveau genre *Pyrosoma*," par M. Péron. Annales du Muséum, tom. iv. p. 437, 1804.

Forskål's Descriptiones Animalium (1775) contains the following passage:—

“29. MEDUSA BEROË. Tres ejus varietates vidi vel species. * * * * *

“29c. RUFESCENS: ovato-oblonga; sæpe 5 poll. longa; intus prorsus vacua. Gallicè, *Concombre de la mer*. In mari Mediterraneo frequens.”

Was *Medusa Berœ rufescens* a *Pyrosoma*?

Pyrosomes, et sur la place qu'ils doivent occuper dans une classification naturelle*," and showed that Lamarck was in error in assigning to *Pyrosoma* a place near *Beroë*, the animal being, in reality, a mollusk closely allied to *Salpa* (*l. c.* p. 420).

The species described by Lesueur was named by him *P. giganteum*, and was obtained in the Mediterranean, near Nice.

Pyrosoma giganteum, says Lesueur, has the general form common to the two other species; it is transparent, of a starchy blue colour, soft and gelatinous, though slightly coriaceous; its only aperture, placed at the upper end, is bounded by tubercles and provided with a membranous expansion, which in certain cases serves to close it. The whole body is covered externally with tubercles, but these are not disposed regularly like those of *Pyrosoma elegans*; they vary in their dimensions, some being short and indistinct, while others are greatly developed. The largest are conico-cylindrical, flattened and lanceolate at the extremity (while those of *P. atlanticum* are simply conical), with a small aperture situated upon that side which looks towards the bottom of the sac: this lanceolate extremity is notched on its sharp edges, and presents below, between its pointed extremity and the opening of which we have just spoken, a small but very prominent keel. The inner surface of the *Pyrosoma* is smooth, and provided with a great quantity of little apertures, each of which corresponds with one of the tubercles, and is only the anterior end of a canal, whose posterior aperture is placed at the free extremity of the tubercle,—a fact easily demonstrated by pouring water into the sac-like body of the *Pyrosoma*; for the water passes out immediately, in a multitude of distinct jets, from the extremities of the tubercles.

Lesueur next proceeds to describe the internal structure of the *Pyrosoma*. He mentions the internal and atrial tunics as one internal tunic, and points out their distinctness from the external, except at the aperture and over those rounded lateral bodies, which I have much reason to think are renal organs. The branchial networks are recognized as such; the endostyle is described as "un vaisseau replié sur lui-même;" the testis is noted, but is interpreted as the liver. The stomach is determined as such, while the intestine is regarded as the œsophagus; and the œsophagus is considered to be the pylorus, opening into what Lesueur regards as the intestine—"un canal assez large, glanduleux vers sa base" (p. 417), but which is, in reality, a sinus full of blood-corpuscles.

The peripharyngeal ridge is accurately described as "deux petits filets qui vont en se courbant de chaque côté," &c. (p. 419); and the nature of the nervous ganglion is rightly determined. *Pyrosoma* is classed among the compound organisms, and the foetuses are carefully though briefly noted. Lesueur confirms Péron's statement concerning the rhythmical contractions exhibited by the whole body in the *Pyrosomata*.

The figures which accompany this memoir are exceedingly good. I judge from them that Lesueur observed the atrial muscles, and that he has mentioned them as the line which separates the first zone of his transverse section (fig. 13 *b*) from the second (p. 415); and again, in the description of the figures 5 & 6, as "les filets qui forment un réseau dont l'usage paraît être de lier les animaux du *Pyrosome* entre eux." In *n*, fig. 5, I imagine

* Read to the Société Philomatique de Paris on the 4th of March, 1815, and published in the 'Journal de Physique' for June of the same year.

I recognize an ovisac. Lesueur describes it as one of the 'œufs' or fœtuses, which are well represented in figs. 8-11.

Contemporaneously with Lesueur*, that great, but unfortunate anatomist, Savigny, directed his attention to the *Pyrosomata*, the peculiarities of whose structure found, at length, an adequate expositor in him; and his account of the anatomy of *Pyrosoma giganteum* is at once so lucid and so concise, that I cannot do better than reproduce it, as an introduction to my own memoir.

The subjects of Savigny's observations were obtained at Nice by Risso, and by him sent to Cuvier.

"This *Pyrosoma* (*P. giganteum*) is a large cylindrical tube, composed of a gelatinous transparent substance, closed and rounded at one end, at the other, truncated and provided with an aperture narrowed by an annular diaphragm, which is not without analogy with the membranous circle of the *Botryllidæ*. The surface of the tube presents conical and smooth eminences of different sizes, some simple and very short, others longer and terminated by a lanceolate piece. Each eminence is pierced at its apex, behind the base of the lanceolate piece, when this exists, by a little circular hole, surrounded by a brown and projecting edge. This aperture, in my opinion, serves to give entrance to the water, and leads into the pharynx.

"The inner wall of the tube presents slight hemispherical enlargements, which correspond with the conical eminences of the external surface, and which are likewise pierced at their apices. The latter apertures, similar to the foregoing both in form and number, are situated opposite the anus, and give exit to the fœces.

"This diametrical opposition of the orifices of its cells is a novel peculiarity of the *Pyrosoma*, and determines the form of the whole body. The functions of each of these orifices seem to me to be sufficiently indicated by their relative position. One is naturally inclined to think that in this genus, as in the foregoing†, it is the most prominent orifice which transmits the food to the pharynx and which admits the water requisite for the branchiæ. Besides this, the water, incessantly renewed at the outer surface of the tube, could not be so rapidly or completely changed in its interior. The arrangement of the viscera in each animal agrees with this first indication.

"To describe the animals of the *Pyrosoma*, we may suppose the cylinder to be placed vertically on its base—I mean, on its rounded and closed end; for the opening of this body is evidently its summit. Each animal then represents an elliptical sac, compressed laterally, whose great axis is horizontal, and consequently perpendicular to that of the cylinder. This sac, formed by a delicate and transparent tunic, is attached to the cell which contains it, only by the circular opposed apertures of its two ends. The extremity which is turned towards the axis of the cylinder is simply rounded: that directed towards the circumference is prolonged into a neck, whose length is proportional to the projection which the cell makes externally, and whose orifice is provided with a festooned

* The second memoir of the second part of the celebrated 'Mémoires sur les Animaux sans Vertèbres,' entitled "Observations sur les Alcyons à deux oscules apparens, sur les Botrylles, et sur les Pyrosomes," bears the inscription, "Lues à la première classe de l'Institut le 1^{er} Mai 1815;" with the note, "Ce mémoire a été présenté le 17 Avril; mais les travaux de la classe en ont fait différer la lecture."

† [viz. *Botryllus*.]

membrane. The lower edge of the sac exhibits the same brown and undulating vessels as the back of the foregoing species, and ought in consequence to be regarded as the corresponding region. The branchial cavity is very large; it occupies those two-thirds of the tunic which lie nearest the circumference of the cylinder: its bottom, which is completely open, communicates freely with the other third, which lodges the viscera of the abdomen. These are small, and situated on the right side. The space which they leave unoccupied is commonly filled by the fœtuses, which successively arrive and are developed there, as we shall see below. The structure of the branchial sac in the *Pyrosomata* may lead one to believe that the water absorbed by the oral, makes its way out by the anal orifice. This would be a feature of resemblance with the *Salpæ*, in which it is indubitable that the water takes this course. However this may be, the network which lines the cavity is otherwise organized: it is loose, and composed of fine, undulating, opaque, white vessels, some of which are longitudinal, while others are transverse and cross the former at right angles—a character which is common to all the genera of this family. The network does not occupy the whole cavity, but only its two lateral walls; so that there are obviously, in this genus, two separate and opposite branchiæ, one on the right and the other on the left, and which are much narrowed, and consequently distant, at the top. In the foregoing genera, the two branchiæ, although really distinct, are only separate behind. The pharynx is at the bottom of the branchial cavity, towards its upper angle. The œsophagus is curved sharply to be inserted into a notch of the stomach, which is placed behind the bottom of the branchial cavity. The stomach is fleshy, smooth, compressed, ovoid, or slightly cordiform. The intestine, very delicate at its commencement, suddenly enlarges; a short course brings it to the inferior edge of the tunic, where it receives the insertion* of a large organ analogous to the liver; afterwards it returns to the stomach, behind which it ends in a simple and rounded anus. The fæces are homogeneous, clear, yellow, and divided into little masses, the last of which is often already engaged in the atrial orifice (*osculum anal*), which seems to prove that the rectum has the power of elongating and of adapting itself to this orifice.

“I must remark, that the liver, or the organ which from its position may be regarded as such, is attached to the intestine by a bundle of divergent canals; that it is rounded, commonly opaque, rose-coloured, yellow or brown, strangulated above its insertion, and divided into from eight to twelve ribs, by grooves which converge from its base to its apex; it is very soft, and may be broken up into oblong pedunculated vesicles. I may add, as a remarkable fact, that, in many individuals, this organ is colourless, and that it resembles a cellular and transparent globule: it also varies greatly in volume; sometimes, and most frequently, it is of the size of the stomach, sometimes five or six times as large†.

“The nervous system of the *Pyrosomata* does not appear to differ essentially from that of the foregoing animals. There are, in like manner, two tubercles, one on each side of the neck of the branchial sac. The anterior or superior tubercle seems to give off several filaments,

* An error: the organ in question being the testis.

† Savigny has here clearly confounded the testis and the ovisac together under the one name of ‘foie.’ What he calls the ribbed organ is the testis; the cellular globule is an advanced ovisac.